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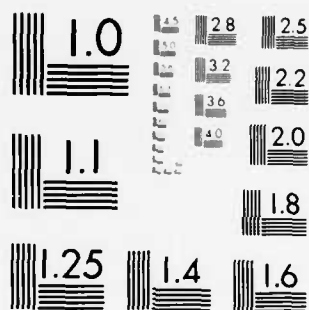
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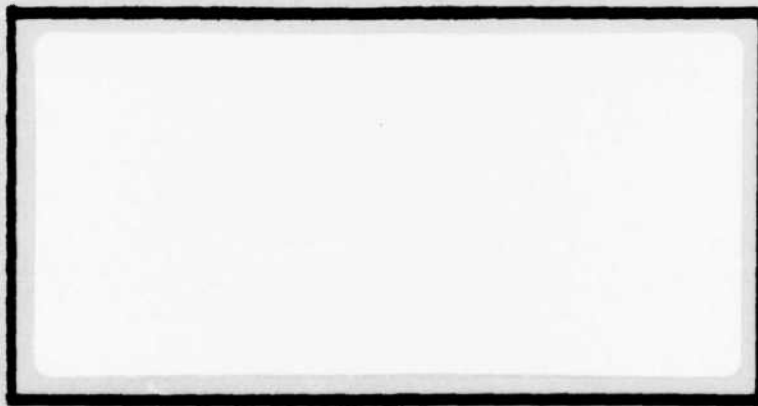
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A CASE STUDY:

AWARD FEES TO IMPROVE QUALITY

Robert Davis, Captain, USAF

LSSR 70-83

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The Department of Defense uses profit and other motivators to encourage contractors to build quality weapon systems. An Award Fee is one method to implement incentives for contractors by providing additional profit for a subjectively graded goal. This study analyzed two Award Fee contracts which stressed Quality in the subjective grading criteria for the Award Fee. Additionally, key government and contractor personnel associated with the Award Fee were interviewed to determine if a set of standard evaluation areas for quality were possible with future Award Fees. The study indicated that standard evaluation areas were possible, the evaluation period should be started early in the design phase to improve quality, and management must stress and promote quality consciousness throughout the company.

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A CASE STUDY:
AWARD FEES TO IMPROVE QUALITY

A Thesis

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirement for the
Degree of Master of Science in Logistics Management

By

Robert Davis, BS
Captain, USAF

September, 1983

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This thesis, written by

Captain Robert Davis

has been accepted by the undersigned on behalf of the
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fulfillment of the requirements for the degree of

Master of Science in Logistics Management

Date: 28 September 1983


Committee Chairman

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I also value the assistance of Roy Wood, my thesis advisor, for his continual encouragement and discussions in formulating directions of pursuit. In addition, I will always be indebted to my typist and former secretary, Lorna Noreault.

Finally, those who suffered the most with me deserve a special mention. Judy, my wife, spent many hours proofreading and consoling; and my sons, Danny and Chris, who were too young to understand, knew that Dad was often preoccupied.

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CHAPTER 1

THE RESEARCH PROBLEM

Introduction

To meet national defense objectives our national security policy requires that the United States remain militarily strong. A strong defense is partially based on the development of high technology weapons. In contracting for major weapon systems, the Department of Defense identifies profit as the basic motivator to encourage contractors; yet, other motivators exist and need to be considered if we are to arrest the decline of the defense industrial base and produce quality weapon systems.

Background

The companies which produce the weapon systems, services, and supplies necessary to meet the national objectives of the United States, make up the defense industrial base. From 1968 through 1975 the number of active aerospace subcontractors decreased from over 6000 to under 4000. In this same period, the foundry industry alone experienced 240 net closings. Between 1970 and 1975, the Air Force determined that the number of subcontractors leaving the defense area more than doubled each year [5:129]. This problem has become so large that

the House Committee on Armed Services initiated hearings on September 17, 1980. In its report the Committee stated that the general condition of the defense industrial base has deteriorated and is in danger of further deterioration in the coming years. In addition, the report depicts an industrial base crippled by declining productivity growth, aging facilities and machinery, shortages in critical material, increasing leadtimes, skilled labor shortages, inflexible government contracting procedures, inadequate defense budgets, and burdensome paperwork associated with numerous government regulations [2:1-5]. Indeed Gansler (5:4) concludes, the defense industrial base is becoming both economically inefficient in the production of defense materials and strategically unresponsive to a production speedup required to meet an emergency.

To meet U.S. National defense objectives, the DoD depends on private industry to provide the necessary weapon systems, services, and supplies. To this end the House Committee expressed concern for present policies and procedures which DoD uses in the procurement process (2:1). According to the Defense Acquisition Regulation (DAR), profit is the basic motive of business; low average profit rates on defense contracts are detrimental to the public interests; and an effective national defense in a free enterprise economy requires that the best industrial

capabilities be attracted to the defense market (22:3-808.1). If DoD is following their profit policy and yet the defense industrial base continues to decline, then we can infer that the profit policy is insufficient to keep the industrial base strong.

While the defense industrial base is declining, there is also a declining need for the quantity of goods. According to a Rand Corporation study (1:10-12), since the advent of the atomic age, the emphasis on weapon systems acquisition has shifted from one of quantity to one of quality. The requirement for massive forces designed to deliver large quantities of explosives has been replaced with highly complex and sophisticated weapon systems. The quality emphasis has not only resulted in changes in design philosophy but has also created many problems in procurement management. "It is a systems complexity that entangles the development, production, and maintenance problems together, creating the knottiest problem of procurement management [1:14]". It is this complexity and entanglement that have brought about the establishment of project type organizations for managing the procurement of the major weapon systems (1:10-12).

If DoD's profit policy is unable to keep the defense industrial base from declining and the emphasis is on quality instead of quantity, then contractor motivation

becomes important in sustaining the defense industrial base while producing quality products. Economic theory explains the motivation of the business corporation with the theory of the firm (6:209-211). Accordingly, in the long run the entrepreneur tries to maximize profits, where profits are defined as total revenues minus total costs. Secondly, the theory assumes a free market, where the free market is defined as a market which exists with no external controls. Under these two conditions the market operates under perfect competition with the following qualities:

1. Each buyer and seller is unable to influence price,
 2. All products are homogeneous,
 3. Free mobility of resources such that one can readily move in or out of the market, and
 4. Perfect knowledge about the marketplace
- [6:212-215].

These conditions are generally not met in a typical business transaction (3:44, 4:31). When considering a business-government transaction, even fewer of the conditions are met. Finally, for major weapon systems acquisition often almost all conditions are violated:

1. There is only one buyer (a monopsony),
 2. There is generally a customized product,
 3. Entry into the defense market is very difficult,
- and

4. After proposals are received, only the buyer has information concerning prevailing prices (3:44).

As a result, the market place of the major weapon system does not fit the competitive situation of classical economics. DoD tries to compensate for this with incentives in some of their negotiated contracts. The most important function of the proper contract design is motivation of the contractor. Depending on the circumstances to be addressed when the contractual relationship is established, there are different types of incentives available, including fixed-price incentives, cost-based incentives, multiple incentives, and award incentives (19:240-251).

In the case of the award incentive, the award fee provisions in federal contracting permit government monitors to unilaterally determine all or part of the contractor's fee on the basis of subjective after-the-fact evaluations of contractor performance. While FY 1978 award fees represented only 2.9 percent of the net value of DoD procurement actions and about 0.5 percent of all military prime contracts, Hunt believes the award fee provides a policy choice which has contracting significance far in excess of its modest number of procurement actions (7:9).

In his study of contractor's response to the award fee, Hunt (3:173-190) found that contractor personnel had:

1. A high responsive attitude,
2. Good communication both internally to their organization and externally to the buying office,
3. An uncomfortable feeling with the subjectivity in spite of being reasonably satisfied with the outcome,
4. Motivation from the award fee, and
5. Increased leverage for the Program Manager with his own management.

In addition, Hunt cautioned that the value of the award fee depends on its being one of no more than a few in the contractor's on-going mix of contracts. If all contracts were an award fee, we can infer that it loses the special attention of the management. As long as the Award Fee attracts management's attention,

The Award Fee method is adaptable to imaginative uses in acquisition and program management, such as motivating contractors to improve their quality assurance programs and encouraging contractor performance beyond contract minima, when such improvement is in the government's interests [3:53].

The motivation of government contractors above contract minima is a key concept to improving the quality level.

A factor in the use of the award fee contract is the periodic report card in support of award decisions, which stimulates intense interest in program progress by top management of both parties. It continues as a stimulative force over the life of the program long after the glow of newness is gone [19:257-258].

According to a study completed by International Technology Corporation (Intec), a direct relationship between quality and profit was difficult to establish. Their evidence was unable to support the contention that profit directly affects quality. Finally, their findings indicated that motivational rewards, such as management recognition of good workmanship and performance, are more effective than financial rewards (9:105-107). As a result Intec proposed the use of the award fee for quality.

Hunt and Intec identify the Award Fee as a possible method of incentivizing quality, which is one of the chief concerns in the production of major weapon systems. In terms of mission effectiveness the quality of material delivered to the USAF has an impact on military readiness. General Robert T. Marsh, Commander of Air Force Systems Command (AFSC), has called for a Quality Improvement Program as one way to meet the President's mandate to modernize our defense force in the face of limited resources. To seek more efficient ways of acquiring weapon systems, General Marsh identified Quality Assurance as an area in which we can achieve significant gains with minimum financial investment [15:1]. According to Leonard and Sasser (14:166), quality improvement is the most fruitful path to higher productivity and competitive success.

Higher quality and lower cost can be achieved through prudent investment in people, product design, and process improvement.

In summary, DoD relies on private industry to develop the major weapon systems required for defense of the country. Yet, the defense industrial base has eroded in spite of DoD's policy to provide adequate profit. Since the marketplace for major weapon systems is not a free market, DoD cannot rely on competition, but must encourage the defense industry with incentives through negotiated contracts. While there are several types of incentives, the award fee incentive can be used to encourage contractor performance beyond the minimum specified, i.e., beyond the minimum quality specified. Finally, quality of material has been identified as an area which could improve the efficiency of acquiring weapon systems. The Award Fee is one method to achieve this efficiency.

Problem Statement

To meet the current goal of AFSC to improve quality of material, we need to motivate and encourage contractors to deliver a better quality product. In a noncompetitive market the award fee incentive motivates contractors by involving top management to provide leadership for quality improvement. However, there are no clear quality measurement criteria to evaluate the contractor's performance in quality.

Review of the Literature

To measure quality, there must be a consistent definition. For the purpose of this study quality will be defined by the DoD definition, "the composite of material attributes including performance, features, and characteristics of a product or service to satisfy a given need [23:encl 2]."

There is a widely held view among the public that the quality of United States manufactured goods has declined. Lieutenant General Skantze believes the decline in product quality is the result of short-range planning: this coupled with the improvement of the next period's profit, while concentrating on cost, schedule, and performance with only minor attention to quality (20:12). Feigenbaum describes the inefficiencies associated with short-range planning,

Traditional industrial practices have created the hidden plant, both factory and office sometimes amounting to as much as 40 percent of total productive capacity, which is used to replace products recalled from the field, to retest and reinspect rejected units, to rework unsatisfactory parts, or to maintain unduly high stocks of spare parts [4:23-24].

Yet, to Leonard and Sasser quality has never been higher; for example, the companies in the field of computers, jeans, and telephone service produce products demanded throughout the world because of their excellence. The perception of a quality decline comes from foreign competitors, which have taken market share away from

domestic producers because of the superiority of the foreign made goods. These competitors have relentlessly pursued quality improvement for the past 20 years as a part of national strategy to build an export economy. In both the American and world markets, demand for quality products has increased. As demand for more reliable, durable, and energy efficient products increases, so does the demand for high quality components, parts and material (14:163-164).

Whether the quality of goods in the U.S. is declining or just not growing as fast as the foreign competitors, the public perceives that foreign competitor's goods are superior. In general, Japan is recognized as the leader in quality manufactured goods (3:17, 10:163, 15:11). The Japanese quality program has excelled in a minimum of three areas: massive training programs, annual quality improvement programs, and upper management leadership in quality. Consequently, Juran feels the West is in serious trouble with respect to quality (9:9-11).

According to Intec, product quality is specified when a technical description of the product is completed. For major weapon systems the specifications of quality begins in the conceptual phase by determination of what the performance parameters must be. Initially, performance is negotiated and traded off between minimum operational requirements and life cycle systems cost. During full

scale development and production, the quality requirements are firmly established as technical requirements. Determination of system performance requirements are made by the user and developing command. Deviations from these requirements must be approved (14:14). This infers quality is initially determined by the customer, and the product must meet his satisfaction.

Quality is divided into "quality of design" and "quality of conformance." Juran (13:8) explains quality of design as a difference in specification for the same functional use, often referred to as grade of an item. The functional need can be illustrated by the use of a Chevrolet or a Cadillac to meet the same purpose. On the other hand, quality of conformance refers to the accuracy of the product meeting the design specifications. Juran also states that quality of design is heavily external to the company, while quality of conformance is internal. Both require consideration to meet quality in the final product.

Intec (9:57) further divides quality into a third category, "quality of the contractor's quality management system", which is the quality management program. With the continuing reduction of quality personnel there has been an increasing reliance on the concept that a good quality program will produce conforming material. This increasing

emphasis has led to the concentration of emphasis on the contractor's management system.

In their study, Intec found no significant fault with the way the government focuses on the contractor's management system or the way it was implemented. Quality of conformance is a key element in the evaluation of the contractor's management system. However, quality of design was not perceived to be part of the quality function. Policies relative to design quality are in broad sweeping concepts that relate to overall system performance including life cycle cost (9:57-58).

The measurement of quality begins by determining the contractor's quality of design, his capability to produce as specified, and the effectiveness of his quality assurance program to assure conformation [18:31]. Since quality is determined by customer satisfaction, there is no universally agreed measure of quality. Quality is usually specified by material characteristic dimensions and instant performance parameters (9:55). These dimensions and parameters become the objective measure for Quality of Design and Quality of Conformance.

In addition to specific characteristics of a product, quality is reflected in its philosophy for business. If the philosophy is interpreted in the quality management system, and each company has its own philosophy, then we

can infer that each company has a unique quality management system. Juran (12:58) points out that the quality mission of a company should be fitness for use, which is an expansion of conformance to specifications, standards, etc. When companies relegate quality to an individual or department, they are only performing part of the task.

To achieve quality excellence in a company, A. V. Feigenbaum, President and Chief Executive Officer of General Systems Company, believes companies must recognize two fundamental principles:

1. Quality is a way of managing the organization,
2. A new form of competition has developed involving company effectiveness in quality and productivity management.

Previously, traditional policies were oriented to customer satisfaction, such that services and technical assistance were readily available to customers. Instead, Feigenbaum promotes quality leadership where products consistently perform correctly when first purchased, and that, with reasonable maintenance, will continue to perform with high reliability and safety over the product life. Repairing the product when it fails is insufficient to meet customer satisfaction (4:22-23). Working first time every time becomes the essence of quality improvement.

In the program for productivity and quality improvement instituted at Public Systems Company, Westinghouse Electric Corporation, President T. J. Murrin believes management's attitude is the most important ingredient in making productivity and quality improvement programs work. There are many factors which impact operating margins, such as inflation, interest rates, government regulations, and recession sensitive markets. These are external factors over which management has little control. Management needs to pay greater attention to the aspects which they are able to control, i.e., technology, money, time, assets, and quality. Better management of resources means improved performance no matter which way the economy goes (17:14).

Generally, quality improvement must start with top management (11:11; 17:14; 4:22). The design and production of high quality goods is not just the quality manager's problem, but also the general manager's problem. Juran identifies quality activities of two types: managerial activity and technological activity. At the managerial level policy is formed, objectives set, people selected and trained, people motivated, and control measures set. On the other hand, technological activities include the quality of such things as product design, specifications, manufacturing planning, instrumentation, production, inspection and test, selling, and service (13:35). Leonard

and Sasser (14:168) found that companies with a successful quality program included:

1. Top management's strategic support,
2. Organizational analysis,
3. Responsibility resting with the total organization,
and
4. Open participation by all employees.

From this we can infer that a quality improvement program should be aimed at the managerial activity level. Without changes in policies and objectives, people within the organization will not be fully motivated to achieve better quality.

The Quality Horizons Report of 1979 raised a question concerning the improvement of quality for major systems acquisition. The study group foresaw a need to identify changes with potential to improve end items quality in field use, make contractors more responsible for their products, make more effective use of resources, and apply appropriate commercial practices. Two of their findings were:

1. Attainment of field quality is a function of the interest and priority placed on quality by top managers, and

2. Product Assurance cannot be inspected into any product. Nevertheless, AFSC places more emphasis on conformance verification than attempting to influence product quality through design, process control, and test planning early in the program life cycle.

High levels of quality are obtained in the commercial sector where top management demands product quality or where competitive market pressures force product quality. Since the market for major weapon systems does not correspond to the free competitive market, top management must be motivated to become involved (18:1-2).

Intended to establish uniform procurement policies, the DAR devotes Section XIV to quality assurance organizational roles and responsibilities. The DoD's primary principle of quality policy in the administration of contracts is the contractor's responsibility concept coupled with the DoD requirement for some type of management system (9:70).

The most detailed management system is outlined by MIL-Q-9858A, Quality Program Requirements, which is required for purchases of complex, critical items defined by military-federal specifications. Complex items have quality characteristics not wholly visible in the end item for which contractual conformance must be progressively established. In the event of failure, a critical item will result in injured personnel or jeopardize a military mission (21:14-101).

In summary, quality can be considered as quality of design, quality of conformance, and quality of the contractor's management system. From all information, management provides the leadership to influence quality. A progressive and improving attitude towards quality must come from the top. While quality begins with quality of design, DoD emphasizes quality of conformance; and MIL-Q-9858A is the most detailed quality management program used to assure compliance with the contract requirements.

Research Objective

The research objective is to analyze the quality evaluation criteria which have been used on Air Force Award Fee programs to incentivize quality and to recommend a set of quality evaluation areas for future use with all Award Fee contracts for Air Force weapon systems.

Research Question

1. Are the evaluation criteria in Air Force Weapon Systems Procurement used to incentivize quality on Award Fee contracts consistent with DAR requirements?
2. How do contractors involved with the Award Fee perceive the award fee concept and the associated quality evaluation criteria?
3. How do government quality managers involved with the Award Fee perceive the award fee concept and the associated quality evaluation criteria?

CHAPTER 2

RESEARCH METHODOLOGY

Award Fee contracting is a management tool which uses subjective evaluation of performance as a basis for determining contractor compensation. The Air Force uses Award Fees to help achieve goals in major system and subsystem acquisitions. The Quality Horizon Study (18:90) recommended the Award Fee as a method to motivate enhanced product quality. As a result, this research was undertaken to evaluate the application of Award Fees in relation to fee theory and other considerations with the plan to offer recommendations for future research and practice.

The previous chapter described the current approach to a quality product in the weapon acquisition process. To motivate contractors to provide enhanced product quality, quality measurement criteria are needed. However, before criteria can be selected, the areas of evaluation must be determined. Justification of this research existed based on the following perspectives: first, observations of the quality system as viewed by the author; second, the Air Force Business Research Management Center identified the need for this research; finally, Aeronautical Systems

Division (ASD) had expressed concern about quality evaluation criteria for the award fee contracts.

Even though ASD is the only division within AFSC which is currently using the quality incentives with the Award Fee contract, the research will apply to all DoD agencies governed by the DAR. The uniform procurement requirement contained in the DAR includes quality requirements which apply to all contractors working on Department of Defense contracts.

Scope of the Research

The Award Fee contract is a subjective tool, yet evaluation areas must be defined and communicated to the contractor. This research did not attempt to evaluate the policies and procedures that set quality requirements, however, this research was directed at standardizing quality evaluation areas for use with the Award Fee incentive. The specific objectives of the project are to (1) compare the quality evaluation criteria used in the two Award Fee plans with quality areas listed in MIL-Q-9858A, (2) obtain the response of contractor personnel to the Award Fee and its associated quality evaluation criteria, and (3) obtain the response of government managers to the award fee and its associated quality evaluation criteria.

Population of Interest

While the universe of Award Fee contracts is large within the Air Force Systems Command, the population of interest narrows to the set of Award Fee contracts which were used to incentivize quality. Within ASD there were two instances where the Award Fee was used to incentivize quality. Therefore, the census for this study is the Award Fee under contract F33657-81-C-2100 on the Advanced Concept Ejection Seat (ACES II) and the Award Fee plan under the Request for Proposal (RFP) F33657-82-R-0067 for the AN/APR 38 Wild Weasel Performance Update Program (PUP).

In the case of the AN/APR 38 the Award Fee is to be included in a future production contract. While we will not have all the results of a completed program, we have partial results to analyze.

Research Question 1

Are the evaluation criteria in Air Force Weapon Systems Procurement used to incentivize quality on Award Fee contracts consistent with DAR requirements?

Data Collection Plan

Data for Research Question 1 was collected by observation from contract files at ASD. A census of the population was taken from the Award Fee plans which ASD used in the two instances to incentivize quality, F33657-81-C-2100 for ACES II and RFP F33657-82-R-0067 for

Wild Weasel PUP. As data was collected from the Award Fee plans general requirements were placed into one of five categories within MIL-Q-9858A. For specific requirements which are peculiar to the product, the data was noted, collected as other pertinent information, and not used further since the objective is to obtain standardized evaluation areas.

Data Analysis Plan

Data was compared and analyzed to quality areas in MIL-Q-9858A (see Appendix A). Request by DAR for items which are complex, critical, and defined by military-federal specifications, MIL-Q-9858A embraces the broadest and most detailed evaluation for the contractor's quality system. For this study, MIL-Q-9858A (21:2-3) was divided into five categories:

1. Quality Program Management.
 - a. Organization.
 - b. Initial Quality Planning.
 - c. Work Instructions.
 - d. Records.
 - e. Corrective action.
2. Facilities and Standards.
 - a. Drawings, Documentation and Changes.
 - o. Measuring and Testing Equipment.

3. Control of Purchases.
 - a. Responsibility.
 - b. Purchasing Data.
4. Manufacturing Control.
 - a. Material and Materials Control.
 - b. Production Processing and Fabrication.
 - c. Completed Item and Inspection Testing.
 - d. Handling, Storage and Delivery.
 - e. Nonconforming Material.
 - f. Indication of Inspection Status.
5. Coordinated Government/Contractor Actions.
 - a. Government Inspection at Subcontractor or Vendor Facilities.
 - b. Government Property.

Data included in the five categories was so noted, and data outside of the categories was noted and collected as other pertinent data.

Research Question 2

How do contractors involved with the award fee perceive the award fee concept and the associated quality evaluation criteria?

Data Collection Plan

Data for Research Question 2 was collected by interview from the contractor's program manager and staff involved with the award fee under F33657-81-C-2100 and RFP F33657-82-R-0067. A census of the population included McDonald

Aircraft Company, Wild Weasel PUP; Douglas Aircraft Company, ACES II; and Weber Aircraft, ACES II. While Weber Aircraft did not have an Award Fee contract, they were the follower on ACES II in the leader-follower program. As the follower Weber had an input into the award fee evaluation process. Interviews will be conducted as discussions of the "Questions for Contractors" which are contained in Appendix B. In that interview guide the first eight questions were used by Hunt in his study (8:191-192). The interview encouraged interviewees to share a broad range of Award Fee information while addressing the specific topics. To promote a frank discussion interviews were conducted without attribution.

Data Analysis Plan

Data was compared and analyzed for common responses and exceptions to the Award Fee and standard evaluation areas for quality.

Research Question 3

How do government quality managers involved with the Award Fee perceive the Award Fee concept and the associated quality evaluation criteria?

Data Collection Plan

Data for Research Question 3 was collected by interview of the census of the population of the government managers involved with the Award Fee under F33657-81-C-2100 and RFP F33657-82-R-0067. Interviews were conducted as discussions

of the "Questions for Government Managers," which are contained in Appendix B. In that interview guide the first eight questions were used by Hunt in his study (8:191-192). The interview encouraged interviewees to share a broad range of Award Fee information while addressing the specific topics. To promote a frank discussion interviews were conducted without attribution.

Data Analysis Plan

Data was compared and analyzed for common responses and exceptions to the Award Fee and standard evaluation areas for quality.

Criteria Test

With the three questions there are six possible combinations of outcomes. The strongest indicator of standardized quality evaluation areas will be the data from question 3, since they are experts involved with quality Award Fees and are interested in the government position. Second is question 2, because the data will favor the contractor's viewpoint of the best way to judge themselves. Finally, the data for research question 1 is the weakest indicator, since it will be data developed at one point in time and does not have the ability to evaluate what was good or bad about the evaluation areas.

The best situation would show all three questions agree to the quality areas to be included. However, if data on two sets of the three questions are agreeable, then the

research objective of determining standard quality evaluation areas for the quality Award Fee incentive will be considered possible.

CHAPTER 3

FINDINGS

The specific objectives of the project were to (1) compare the quality evaluation criteria used in the two Award Fee plans with quality areas listed in MIL-Q-9858A, (2) obtain the response of contractor personnel to the Award Fee and the quality evaluation criteria, and (3) obtain the response of government managers to the Award Fee and the quality evaluation criteria.

Comparison of Award Fee Plans

There are two instances at ASD where quality evaluation areas were heavily weighted in the Award Fee Plan. Under ACES II, contract F33657-81-C-2100, the Quality Assurance evaluation criteria constituted 30% of the total weight during the first evaluation period and 25% of the total weight during the second evaluation period. Under Wild Weasel PUP, RFP F33657-82-R-0067, Quality/Producibility and Product Assurance constituted 75% of the total weight of the Award Fee.

Each program had different goals, so their criteria was designed to meet those goals. Also areas in MIL-Q-9858A are not mutually exclusive, hence they are redundant and overlap. All evaluation criteria which were used are contained in Appendix C.

Except for a few areas which fit into specific categories, all evaluation criteria fell into the Quality Program Management category. In the case of ACES II, Facilities and Standards included the evaluation criteria of the calibration system and manufacturing/tooling inspection. For the category of Control of Purchases the evaluation criteria included supplier rating and selection. Under the Manufacturing Control category the evaluation criteria included major/critical product or system deficiencies and source inspection. All remaining criteria fell under the Quality Program Management category and included procedures evaluation, quality planning, corrective action, trend analysis, timeliness/adequacy of corrective action, work instructions, schedule completion and cost of quality.

The planned evaluation areas for Wild Weasel were developed after ACES II. The criteria was detailed and not as easily classified under MIL-Q-9858A categories. Again Control of Purchases was included by evaluating the control of suppliers. Manufacturing Control was evaluated by in-process preventive quality control and delivered product quality. All of the other characteristics fell under the Quality Program Management category which included quality of design, product assurance, and adherence to management system requirements.

In summary, the majority of the criteria used were subjective evaluations of management of quality. Additional criteria evaluated control of purchases and manufacturing control.

Results of Contractor's Interviews

Reported here are the results of in-depth interviews with three contractors associated with the Award Fee on ACES II and Wild Weasel PUP. A total of 14 individuals, mainly program managers and staff, were interviewed. Interviews ranged in length from one hour to approximately three hours. On two occasions more than one representative of a contractor's organization participated together in the discussion, which regularly included reviews of contractor-supplied documents relevant to the subjects of discussion. All responses shown are summaries of interview questions and quotations are without attribution.

1. What effect did Award Fee have on Organizational and Staffing Patterns?

From the contractor's perspective there was little extra work required. ACES II used no additional staff and Wild Weasel PUP anticipates no additional staff. A matrix organization should be adequate to handle all program requirements in the limited time the award fee

is in effect. While there were no additional personnel required, the additional workload did require more time and effort. In the case of ACES II there was considerable time and effort by the quality department. Extensive and detailed planning were required to meet the government quality system requirements. The follower company was not involved with government contracting for ten years and found the leader's quality department to be very responsive.

A major concern for all companies involved was to understand what is necessary and to perform according to contract. From a program manager's point of view to exceed contract requirements increases the cost to the government, contractor or both.

2. What Information is given contractors on Government Award Fee Plans?

Award Fee plans were comprehensive and straightforward. The System Program Office (SPO) solicited comments and some performance factors were affected in negotiations. Each plan provided evaluators by office symbol and organization, number of evaluation periods, and time phasing of the evaluation periods.

3. Do the Contractors contribute Input to Award Fee Evaluations?

As part of the Award Fee plans the contractors were provided the opportunity to present input to the Fee

Determining Official (FDO). While the Wild Weasel has not progressed to that stage, the ACES II contractor did take advantage of his opportunity to meet with the FDO prior to the award. As a result of the meeting and his explanation of the company's effort, the Award Fee was increased.

4. What Feedback is Given Contractors on their Award Fee Evaluations?

Feedback is expected if progress is desired. In the case of ACES II the contractor did receive feedback for both evaluation periods. As a result of the feedback from the first period, Douglas Aircraft personnel believed the same approach should be used in the second period.

5. How well do you understand the Award Fee Objective?

The contractor's personnel understood the basic objectives of the Award Fee in each situation. For ACES II the objective was to motivate the leader to provide training and the transfer of knowledge to the follower. For Wild Weasel PUP the objective was to motivate the contractor to meet Design to Cost goals. The Award Fee is the government's attempt to create an incentive "over and above" the contract and to reward for excellence of performance. One objective is to receive a high quality product or higher than specified.

Even though contractor personnel understood the basic objective for each program, they felt uneasy about the unilateral determination of the Award Fee.

6. How does the Award Fee affect Organizational Processes?

Each program is relatively minor to the overall defense business of the corporation. As a result, the Award Fee has little effect on organizational processes. If anything, communication improves. However, it is the job of each person involved on the program to know the line and functional organization in order to discuss and resolve problems. The job of management is to focus attention and to resolve identifiable problems; and, while management was concerned, they displayed no unusual attention because of the Award Fee.

In the case of ACES II the product had high visibility, since it was a life support system. Meanwhile, the follower believed the Award Fee provided extra incentive to communicate, but there was not extra management attention.

7. What are the effects of Award Fee on Program Outcomes?

Most people believe the Award Fee can only benefit the contract, since it is another motivator. At worse, it has no effect. For the leader-follower situation, the contractor's personnel viewed the fee as a payoff for the transfer of knowledge at the expense of the

leader. The amount of business which would be lost in the future years far exceeds the amount of the Award Fee. Also, the Air Force must maintain enough business to support the two contractors.

In the case of the Wild Weasel, it is too early to determine the program outcome, but the contractor's personnel believe it will not hinder the program. As long as the proper criteria are used, it should help the program.

8. Is the Award Fee used in Subcontracting?

While one company did have some Award Fee subcontracts, they are rare and most personnel have no knowledge of them.

9. What are some Strengths and Weaknesses of the Award Fee Method of Acquisition?

The primary strength comes from the additional profit incentive allowing management to focus attention on desired areas of interest. As an incentive tool, it should provide more than would otherwise be achieved.

From the contractor's viewpoint, the Award Fee's only weakness comes from the subjective evaluation criteria. In the case of ACES II, the contractor's personnel would prefer an Award Fee based on product enhancement instead of a leader-follower situation. For Wild Weasel the Award Fee is not definite, it is a

carrot that could disappear from the later production contract.

10. What are the Strengths and Weaknesses of the Award Fee Method for Stimulating Better Quality?

The Award Fee is structured differently from other incentives, but the idea of motivating the contractor to achieve a specific goal remains the same. Contractor personnel are uneasy about the subjective evaluation criteria preferring objective criteria in incentive arrangements. While the Award Fee is a positive motivator, money does not buy better quality. Quality must be bid into the job with the proposal prior to the design. A quality conscious company will strive to improve quality, and the Award Fee does not necessarily increase the quality consciousness of the company. However, the Award Fee does have an advantage over the incentive fee, since the incentive fee aims at controlling cost which may conflict with quality and cause tradeoffs. The best place to use an Award Fee is trying to implement a quality consciousness, since regulations merely induce compliance.

11. What Quality Criteria should be used in the Evaluation Process?

Quality is achieved by knowing the customer's requirements and fitting the product to its intended

use. The quality conscious company knows that good quality is good business. To this end one must look for management's attitude and quality control's attitude. Some factors to consider are participation in design review; continued configuration management; integration of subassemblies into the weapon system; an independent quality system reporting to an executive division; the quality of the people, their knowledge, and experience; evaluation of vendor's quality and compliance to requirements; cost related to quality in the form of scrap, repair, and rework; management attention; examination of negative trends and corrective action; and proper manning of the organization.

12. What influence did the Award Fee have on the design of product?

For ACES II the design was completed prior to the Award Fee. Consequently, there was no influence on the design.

In contrast, the Wild Weasel PUP is in the development stage. Even in this case, contractor personnel claim the design was too far along to be heavily influenced by the Award Fee. The primary incentive to produce a good design was the competition to win the contract over the contractor's competition.

Since specifications usually set the requirements, both contractors believe the Award Fee will influence the design of a product, if criteria are detailed and early enough.

13. What problems occurred with the Quality Criteria associated with the Evaluation Process?

With the exception of subjectiveness of criteria, the contractor personnel had no complaints about the quality criteria. To them the quality criteria were a contractual requirement which had to be accomplished.

14. What feedback does the contractor receive about the product in the field?

Contractor personnel had no complaints about data from the field. Service reports and maintenance data were available and used.

Results of Government Manager's Interviews

Reported here are the results of in-depth interviews with government managers associated with the Award Fee on ACES II and Wild Weasel PUP. A total of 12 individuals, mainly program managers and staff, were interviewed. Interviews ranged in length from one hour to approximately two hours. On one occasion, two government managers participated together in the discussion. All responses shown are summaries of interview questions and quotations are without attribution.

1. What effect did Award Fee have on Organizational and Staffing Patterns?

From the government perspective there was little effect on the organizational structure and staffing patterns. System Program Offices are set up under a matrix type organization with support provided by a home office within ASD. The same personnel provided representation whether or not there was an Award Fee. Manpower limitations, generally, prevented additional people from being assigned. Considering the lifespan of the SPO, the Award Fee involved a relatively short period of time in that lifespan.

Even though the program generally operated with existing personnel, there was an increase in the workload. The Award Fee was a new task requiring learning and planning. Teams had to be formed, criteria setup, and problems anticipated. Evaluations included support from resident government personnel at the contractor's facility as well as the SPO's evaluation team. While some data was subjective, it needed to be analyzed. As the emphasis shifted, changes were made to the evaluation criteria. If members of the evaluation team had negative feelings toward the Award Fee, they had to be motivated; and the contractor had to be unusually responsive to requests from the government.

There were positive benefits in the form of increased management attention and greater communication by program participants. During the early phases management required briefings on the Award Fee plans and objectives. As a result closer ties were formed within the matrix organization and earlier in the program. In addition, more support was required from the resident organization providing feedback to the program office. Finally, there was greater interfacing with the contractor.

2. What Information is given contractors on Government Award Fee Plans?

The Award Fee plan is a comprehensive breakdown of the performance factors and the plan for evaluation. Contractors can have some input during negotiation, however, the basic plan is provided by the government. Performance factors are divided into major areas. However, the contractor is not provided a detailed breakdown of the scoring procedure and the criteria which the evaluator uses. As a result, there is flexibility to change emphasis as needed, since the process is iterative. From the general areas the contractor is able to focus attention on the objectives and should be able to approximate the Award Fee.

The plan identifies the number of evaluation periods and the evaluators by the office symbol and the organization. Names are not associated in the early stages due to potential personnel changeover. The key people are usually the same, although new personnel may be introduced during each period. Each area of expertise should be represented and the areas should be germane to the performance factors rated. While evaluation periods are identified, the resident government personnel may perform continuous observations during the period.

3. Do the Contractors contribute Input to Award Fee Evaluations?

In these two programs the contractors have the opportunity to brief the FDO. In the case of the Wild Weasel the program has not progressed that far, but the Award Fee plan has the provision for the contractor to offer self-evaluation. It is an opportunity to be vocal and explain how the contractor met the performance factors and exceeded the requirements. As a result, the contractor must brief a high level official and address issues not normally brought before higher management within the Air Force.

4. What Feedback is Given Contractors on their Award Fee Evaluations?

Feedback varies for each program, but formal and informal feedback was provided to the contractors. To improve, it is necessary to provide feedback on lessons learned. While formal briefings were held for each evaluation period, it is questionable whether the evaluation team's report should be provided to the contractor. The resident government representative must maintain a good working relationship with the contractor and candid opinion could be withheld. The majority of informal quality feedback would come from the resident Quality Assurance Representative (QAR). In any event care must be exercised with informal feedback to avoid constructive changes which would entitle the contractor to equitable adjustment under the Changes clause of the contract.

5. How well do you understand the Award Fee Objective?

Each program had a specific objective, and response to this question showed a good understanding of the Award Fee objectives and process for each program. The objective of ACES II was to motivate the leader to orient the follower to provide a quality product in a reasonable time consistent with the leader's past

performance. For the Wild Weasel PUP the objective was to motivate the sole source contractor to control production and life cycle costs without sacrificing quality of the product. Each of these has a strong incentive to do things early in the contract to cause quality to be designed into the system. To accomplish the task of achieving a quality product requires criteria which can be measured.

6. How does the Award Fee affect Organizational Processes?

In the areas of communication processes, management attention, decision-making, and financial planning, communication receives the most positive responses. Nearly all agree that both formal and informal communication processes are improved. The Award Fee is another area to be discussed, and contractor performance must be communicated.

Within the Air Force organization there is an increased participation by the Contract Administration Office, and there is more management attention through briefings prior to contract award and through the fee determining process.

Even though there is increased emphasis on the important objectives, there appears to be little noticeable difference in contractor management attention above the middle managers. Government

managers feel the amount of the Award Fee is insignificant to a large government contractor. Other intangible incentives, such as getting the next contract, may influence decision making and management attention more than the Award Fee.

7. What are the effects of Award Fee on Program Outcomes?

The Award Fee will not solve all problems, but it did not hinder the program. When managed properly, it is helpful, yet we need to continue with other incentives. By using the Award Fee, important points were identified early, and a review structure was created to evaluate the contractor's response. Even though it was a positive motivator, the question becomes, was the quality of the product any better? In the final analysis of ACES II there was probably no effect on the quality of the product, since the first 300 ejection seats procured by the follower did experience more field complaints than the leader's seats. However, there is no way to know if that would have been any different without the Award Fee.

8. Is the Award Fee used in Subcontracting?

While most contractors favor being on the receiving end of the award fee, the government managers had no knowledge of the prime contractor using the Award Fee with subcontractors.

9. What are some Strengths and Weaknesses of the Award Fee Method of Acquisition?

The primary strength from the government point of view is the value of a management tool to focus attention in specific areas. The Award Fee has flexibility over other incentive contracts, since it is not tied to quantifiable measures. Meanwhile, desires are specifically addressed and tied to the cost of the contract. Because of management's focus there is increased confidence that a product will be built to specifications.

In contrast, the primary weakness seems to be that the contract requirements are already on contract. It is difficult to assess that the contractor is performing any differently as a result of the award fee. While the award fee is subjectively evaluated, objective criteria must be the basis for the subjectively determined fee, and objective criteria are difficult to establish. In addition, there is the possibility that the cost exceeds the benefits. As part of the cost, the additional administrative workload must be properly managed and manned. In the front end of the program there is a considerable amount of work involved with planning and structuring the

Award Fee process. Finally, the fee is not big enough to influence a large government contractor, and motivated people are necessary to implement and carry out the Award Fee process. Since it is difficult to quantify, the Award Fee may become a give away that is influenced by a political decision.

10. What are the Strengths and Weaknesses of the Award Fee Method for Stimulating Better Quality?

Conveying the specific incentive to improve quality will provide management attention to focus on quality consciousness. The Award Fee has an impact on future performance, whereas past performance is evaluated in source selection. The potential to affect future performance requires the award fee to be used early in the acquisition cycle to build a better quality system early. Also, the award fee could be used as late as the Production Phase in a sole source situation where it is difficult to quantify performance. Since purchased parts are important to the quality of a system, the Award Fee should motivate the contractor to manage his subcontractors and vendors. Additionally, the Award Fee should provide an incentive to the Contract Administration Office to track and communicate the contractor's performance.

Conversely, the Award Fee is a judgement call based on experience with the contractor and the program. We are paying for extra quality when there is no true measure of quality. Since the fee is subjective we could be awarding for improvements not required or paying extra for no improvements. Without a specific objective, the Award Fee should not be used.

11. What Quality Criteria should be used in the Evaluation Process?

The majority of responses preferred evaluation criteria based on objective evidence. For quality of conformance there are many objective elements based on specifications and drawings. In addition, yields of processes, inspections, and tests are methods of determining quality of manufactured items. Finally, the physical configuration audit, functional configuration audit, and first article will demonstrate conformance.

Likewise for quality of design there are many objective elements to determine the fitness for use. Most of these elements are related to reliability and maintainability. In addition, the released design on engineering's parts and tolerances may be matched to the manufacturing process. While some thought the rate of engineering changes would be a good criteria, others believed it would encourage the contractor to hide changes until after the award period.

In the area of management of quality the measurement criteria become subjective when determining the quality consciousness of the contractor. Some elements to consider include the status of the chief of quality within the organization; where does the quality reporting stop within the chain of command; management of subcontractors and vendors; the cost of quality which includes scrap, rework, and repair; and responsiveness and resolution of corrective action within the plant and to field complaints.

Most people felt uncomfortable with the subjective criteria, while some believe that objective criteria may present a facade where subjective judgement is used to obtain the objective evidence. Some even believe that the Award Fee is inappropriate when there is objective criteria available for an incentive contract.

Overall, the effort should be tailored for the specific objectives of the program. The emphasis should be on excellence in management and aggressiveness in working quality issues.

12. What influence did the Award Fee have on the design of the product?

In the case of the ACES II, the Award Fee was used in a leader-follower program after the design of the

ejection seat. Approximately 2000 units had been built by the leader prior to the Award Fee. As a result, there was no change to the design of the product influenced by the Award Fee.

For the Wild Weasel PUP, the Award Fee was incorporated in the second RFP issued for the development program. The terms called for a potential Award Fee on the later production contract. Government managers hoped for an influence on the design by providing advance knowledge of the Award Fee. Government managers believe it is too early in the program to determine if any influence occurred to the design.

13. What problems occurred with the Quality Criteria associated with the Evaluation Process?

In a subjective situation quantifying performance against evaluation criteria is difficult. For ACES II the leader was to elevate the follower to become a direct competitor. This in itself poses a unique problem in motivating a contractor to give away part of his business. In addition, an ejection seat is a crewmen's last means of escape in a life threatening situation. As a result, the seat is quality sensitive with desired high reliability. In this situation, the Award Fee was based on how well the leader instructed.

Government managers felt future situations should include how well the follower learned. The goal is to be satisfied that performance objectives are met, and it is difficult to distinguish "over and above" effort from normal effort. In the case of Wild Weasel, the evaluation criteria have not been used, however, government managers hope for a positive motivator while realizing that perfection is seldom achieved.

While quality areas may be redundant, government managers believe it is better to be redundant than to miss something significant, especially in the case of a critical item, which could cause loss of a life or mission failure. Consequently, in designing the criteria there was no effort to make criteria mutually exclusive. Also, because of the inter-relationships, it is necessary to have flexibility in the evaluation areas and process. Since the Award Fee is "over and above" the normal contract profit, it should be a positive motivator.

14. What feedback does the contractor receive about the product in the field?

The Air Force has reliability, maintainability, and availability data available to the contractor with every program having different arrangements. For an initial deployment, it may be necessary to have contractor technical representatives in the field to examine on site

conditions and failures. This provides prompt information to the contractor and supplements the formal Air Force system.

In the case of ACES II, the ejection system was already designed and proven. Reliability and maintainability were in the specification with no new requirements. Since Wild Weasel PUP is in the development stage, reliability and maintainability must be proven in the future.

The largest problem seems to be providing feedback on system performance to the subcontractors, although there are efforts to improve this communication link.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

Before any conclusions are drawn from the previous chapters, it must be remembered that the two cases involved two divisions of a single corporation, which has been a major DoD contractor. In addition the ACES II was a leader-follower situation where the Award Fee had a primary goal of orienting a follower to provide a quality product in a reasonable time consistent with the leader's past performance. The enhanced product quality was on the training provided by the leader, not the ejection seat. As a result of the training, the follower's seat should have been just as good as the leader's seat. Also in the case of the Wild Weasel, the primary goal was to motivate the sole source contractor to control production and life cycle costs without sacrificing quality of the product. The Wild Weasel is an existing aircraft, the Performance Update Program contract was awarded to the sole source aircraft contractor to obtain an updated electronics package for the aircraft. Hopefully, the contractor will achieve the design and control the costs without degradation to the existing aircraft's reliability. The desired enhanced product quality is on the electronic hardware. In each situation, the Air Force is purchasing management of the desired goal.

Conclusions

Conclusion One

A set of standard quality evaluation areas are feasible for use with all award fee contracts, but specific quality evaluation criteria should be unique to each situation.

Based on the criteria test in Chapter 2, all three research questions produced some common quality evaluation areas. As a result of the Award Fee plans and the interviews of government and contractor personnel, the following quality evaluation areas should be used for a quality program:

1. Internal quality management
 - a. Managerial activity
 - (1) Management involvement.
 - (2) Objectives set.
 - (3) Status of the chief of quality.
 - (4) Internal quality discipline.
 - (5) Independence of the quality assurance department.
 - (6) Proper manning including knowledge, experience, and employee motivation.
 - (7) Trend analysis and corrective action.

b. Technological activity.

(1) Quality of design.

(2) Reliability.

(3) Producibility.

(4) Cost of quality.

2. External quality management

a. Supplier management and control of purchase.

b. Nonconforming material and corrective action.

Evaluation criteria must be thoughtfully chosen to match the desired objectives. Since each contract has different objectives, standard evaluation criteria for each evaluation area may not be applicable. Also, by presenting a standard grading criteria, contractors may merely comply with the published criteria instead of being creative towards quality improvement. The primary concern is management of the quality system. How does management plan and control quality internal to the organization and quality external to the organization? The decisions and decision process which management uses to bring a positive change of quality should influence the Award Fee. While Quality of Design and Quality of Conformance are important, these areas can usually be evaluated objectively. MIL-Q-9858A contains objective criteria to stress compliance to the contract. However, the Award Fee should be aimed above and beyond compliance to a contract.

Excellence in management and aggressiveness in working quality issues are determined by the policies and objectives which management communicates verbally and in writing. These policies and objectives set the stage for quality of the product and quality improvement.

Conclusion Two

The Award Fee is a potent motivator at the program level and should be used early in the design phase.

A competitive company will strive to meet its goals, even to the extent that it may later lose a portion of its business. If nothing else, the Award Fee forces the contractor to think of alternatives to accomplishing the task. By winning a major portion of the Award Fee, there is recognition of a job well done, which promotes esprit de corps among the program manager and his staff. While the Award Fee was not directly filtered down to the workers on the program, the Program Manager was evaluated on the program's profitability which the Award Fee directly affects.

Because the ACES II program had high visibility prior to the Award Fee, there can be no conclusions drawn about upper management's involvement. Most individuals in both programs believed upper management displayed the same involvement as

a "normal contract". However, on the Air Force side, there were additional briefings to upper management on the Award Fee in the planning stage. Also management was involved in the evaluation stage. As a result, the government personnel extensively planned the contract and evaluated the contractor. In the case of ACES II, the program manager initially recommended the Award Fee and leader-follower program be refused. Upper management made a decision to accept the contract, it was not based solely on the Award Fee. Since it would involve future competition for one of the company's product lines, the size and diversity of the company should have influenced this decision to accept the leader-follower and Award Fee program with the contract.

These instances verified Hunt's finding that the Award Fee is a potent motivator, yet the evaluation period must be early enough to affect management. To achieve the maximum benefit from motivation, the Award Fee should be used early to identify important goals and objectives. In addition, the contractor is most aware of the Award Fee and the goals during the evaluation period. Meanwhile, in Wild Weasel the Award Fee was proclaimed early enough, but the contractor personnel were not accountable until the production contract. When this happens, the length of time between the goal formation and the evaluation period minimizes the effect of the

Award Fee on design considerations. Moreover, in ACES II the contractor took feedback or lack of feedback from the first evaluation period to determine how to proceed in the second period. The percentage of the Award Fee from the first period provided a measure of customer satisfaction and influenced the performance or change to performance for the second evaluation period.

Conclusion Three

For the Award Fee to influence Quality, Upper Management must stress and promote Quality Consciousness throughout the company.

With management providing leadership and stressing quality consciousness, all areas of the company become involved with the goal of quality enhancement instead of just the program manager and his staff. The more people that become involved, the more suggestions that will be generated.

When the Award Fee limits involvement to the program manager and his staff, the quality organization is outside of the enhancement process or becomes limited to the few quality members on the program manager's staff. Any

suggestions for an improved quality system will have to go through a quality organization which is not tasked to seek improvement. In both ACES II and Wild Weasel, the companies exhibited a quality consciousness prior to the Award Fee. Two factors which influenced this quality consciousness are the U.S. trend to be more quality conscious because of the Japanese quality, and the product as a life support system which provides crewmen a means of escape from a life-threatening situation.

Summary

The Award Fee is good for promoting enhanced product quality or any objective. By stressing a goal, managers are forced to consider alternatives which may improve the situation. Evaluation criteria must be thoughtfully chosen to match the objectives. For quality enhancement, standard evaluation areas may be used and should focus on management's ability and attitude toward quality. Finally, it is important to have upper management leading the total company to a state of quality consciousness and creativity towards quality improvement.

Recommendations

In the Weapon Acquisition Process, each new system is unique and rarely fits into a predetermined mold.

Consequently, the contracting process is constantly changing to meet the specific requirements of the current situation. Since contracting for a major weapon system is an iterative process, I propose a number of recommendations based on the ACES II and Wild Weasel PUP programs.

Recommendation One

Quality Evaluation Areas should be devoted to measuring management's ability, attitude, and leadership towards quality enhancement such as those evaluation areas listed in Conclusion One.

Recommendation Two

To promote the involvement of upper level management, quality objectives should be stated and periodic reports on progress in meeting these objectives should be required during the evaluation period.

Recommendation Three

The contractor should participate in the selection of the quality evaluation areas and criteria to demonstrate his understanding of the objectives of the Award Fee.

Recommendation Four

More study is needed on the effects of the Award Fee for quality enhancement, especially in the area of the motivational value of the size of the Award Fee and the relationship with the size of the company.

Recommendation Five

The Quality Award Fee should be tried on a small company that does not have a large product line and that has had a history of quality problems.

Recommendation Six

The evaluation period for Quality Award Fees should begin during the early stages of product design and development.

Recommendation Seven

A study should be conducted to establish specific evaluation criteria that could be used for each evaluation area listed in Conclusion One.

APPENDIX A

MIL-Q-9858A

R-5

MIL-Q-9858A
AMENDMENT 1
7 August 1981

MILITARY SPECIFICATION
QUALITY PROGRAM REQUIREMENTS

This amendment forms a part of Military Specification MIL-Q-9858A, dated 16 December 1963, and is approved for use by all Departments and Agencies of the Department of Defense.

PAGE 2

2.1, lines 9 and 10: Delete "MIL-C-45662--Calibration System Requirements" and substitute: "MIL-STD-45662--Calibration Systems Requirements".

PAGE 4

4.2, line 15: Delete "MIL-C-45662 "and substitute: "MIL-STD-45662".

Custodians:

Army - AR
Navy - NM
Air Force - 05

Preparing Activity:

Air Force - 05

MILITARY SPECIFICATION

QUALITY PROGRAM REQUIREMENTS

This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, the Air Force and the Defense Supply Agency.

1. SCOPE

1.1 Applicability. This specification shall apply to all supplies (including equipments, sub-systems and systems) or services when referenced in the item specification, contract or order.

1.2 Contractual Intent. This specification requires the establishment of a quality program by the contractor to assure compliance with the requirements of the contract. The program and procedures used to implement this specification shall be developed by the contractor. The quality program, including procedures, processes and product shall be documented and shall be subject to review by the Government Representative. The quality program is subject to the disapproval of the Government Representative whenever the contractor's procedures do not accomplish their objectives. The Government, at its option, may furnish written notice of the acceptability of the contractor's quality program.

1.3 Summary. An effective and economical quality program, planned and developed in consonance with the contractor's other administrative and technical programs, is required by this specification. Design of the program shall be based upon consideration of the technical and manufacturing aspects of production and related engineering design and materials. The program shall assure adequate quality throughout all areas of contract performance; for example, design, development, fabrication, processing, assembly, inspection, test, maintenance, packaging, shipping, storage and site installation.

All supplies and services under the contract, whether manufactured or performed within the contractor's plant or at any other source, shall be controlled at all points necessary to assure conformance to contractual requirements. The program shall provide for the prevention and ready detection of discrepancies and for timely and positive corrective action. The contractor shall make objective evidence of quality conformance readily available to the Government Representative. Instructions and records for quality must be controlled.

The authority and responsibility of those in charge of the design, production, testing, and inspection of quality shall be clearly stated. The program shall facilitate determinations of the effects of quality deficiencies and quality costs on price. Facilities and standards such as drawings, engineering changes, measuring equipment and the like which are necessary for the creation of the required quality shall be effectively managed. The program shall include an effective control of purchased materials and subcontracted work. Manufacturing, fabrication and assembly work conducted within the contractor's plant shall be controlled completely. The quality program shall also include effective execution of responsibilities shared jointly with the Government or related to Government functions, such as control of Government property and Government source inspection.

1.4 Relation to Other Contract Requirements. This specification and any procedure or document executed in implementation there-

MIL-Q-9858A

of, shall be in addition to and not in derogation of other contract requirements. The quality program requirements set forth in this specification shall be satisfied in addition to all detail requirements contained in the statement of work or in other parts of the contract. The contractor is responsible for compliance with all provisions of the contract and for furnishing specified supplies and services which meet all the requirements of the contract. If any inconsistency exists between the contract schedule or its general provisions and this specification, the contract schedule and the general provisions shall control. The contractor's quality program shall be planned and used in a manner to support reliability effectively.

1.5 Relation to MIL-I-45208. This specification contains requirements in excess of those in specification MIL-I-45208, Inspection System Requirements, inasmuch as total conformance to contract requirements is obtained best by controlling work operations, manufacturing processes as well as inspections and tests.

2. SUPERSEDING, SUPPLEMENTATION AND ORDERING

2.1 Applicable Documents. The following documents of the issue in effect on date of the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

MILITARY

MIL-I-45208 —Inspection System Requirements

MIL-C-45662 --Calibration System Requirements

2.2 Amendments and Revisions. Whenever this specification is amended or revised subsequent to its contractually effective date, the contractor may follow or authorize his subcontractors to follow the amended or revised document provided no increase in price or fee is required. The contractor shall not be required to follow the amended or revised document except as a change in contract. If

the contractor elects to follow the amended or revised document, he shall notify the Contracting Officer in writing of this election. When the contractor elects to follow the provisions of an amendment or revision, he must follow them in full.

2.3 Ordering Government Documents. Copies of specifications, standards and drawings required by contractors in connection with specific procurements may be obtained from the procuring agency, or as otherwise directed by the Contracting Officer.

3. QUALITY PROGRAM MANAGEMENT

3.1 Organization. Effective management for quality shall be clearly prescribed by the contractor. Personnel performing quality functions shall have sufficient, well-defined responsibility, authority and the organizational freedom to identify and evaluate quality problems and to initiate, recommend or provide solutions. Management regularly shall review the status and adequacy of the quality program. The term "quality program requirements" as used herein identifies the collective requirements of this specification. It does not mean that the fulfillment of the requirements of this specification is the responsibility of any single contractor's organization, function or person.

3.2 Initial Quality Planning. The contractor, during the earliest practical phase of contract performance, shall conduct a complete review of the requirements of the contract to identify and make timely provision for the special controls, processes, test equipments, fixtures, tooling and skills required for assuring product quality. This initial planning will recognize the need and provide for research, when necessary, to update inspection and testing techniques, instrumentation and correlation of inspection and test results with manufacturing methods and processes. This planning will also provide appropriate review and action to assure compatibility of manufacturing, inspection, testing and documentation.

3.3 Work Instructions. The quality program shall assure that all work affecting

quality (including such things as purchasing, handling, machining, assembling, fabricating, processing, inspection, testing, modification, installation, and any other treatment of product, facilities, standards or equipment from the ordering of materials to dispatch of shipments) shall be prescribed in clear and complete documented instructions of a type appropriate to the circumstances. Such instructions shall provide the criteria for performing the work functions and they shall be compatible with acceptance criteria for workmanship. The instructions are intended also to serve for supervising, inspecting and managing work. The preparation and maintenance of and compliance with work instructions shall be monitored as a function of the quality program.

3.4 Records. The contractor shall maintain and use any records or data essential to the economical and effective operation of his quality program. These records shall be available for review by the Government Representative and copies of individual records shall be furnished him upon request. Records are considered one of the principal forms of objective evidence of quality. The quality program shall assure that records are complete and reliable. Inspection and testing records shall, as a minimum, indicate the nature of the observations together with the number of observations made and the number and type of deficiencies found. Also, records for monitoring work performance and for inspection and testing shall indicate the acceptability of work or products and the action taken in connection with deficiencies. The quality program shall provide for the analysis and use of records as a basis for management action.

3.5 Corrective Action. The quality program shall detect promptly and correct assignable conditions adverse to quality. Design, purchasing, manufacturing, testing or other operations which could result in or have resulted in defective supplies, services, facilities, technical data, standards or other elements of contract performance which could create excessive losses or costs must be identified and changed as a result of the

quality program. Corrective action will extend to the performance of all suppliers and vendors and will be responsive to data and product forwarded from users. Corrective action shall include as a minimum:

(a) Analysis of data and examination of product scrapped or reworked to determine extent and causes;

(b) Analysis of trends in processes or performance of work to prevent nonconforming product; and

(c) Introduction of required improvements and corrections, an initial review of the adequacy of such measures and monitoring of the effectiveness of corrective action taken.

3.6 Costs Related to Quality. The contractor shall maintain and use quality cost data as a management element of the quality program. These data shall serve the purpose of identifying the cost of both the prevention and correction of nonconforming supplies (e. g., labor and material involved in material spoilage caused by defective work, correction of defective work and for quality control exercised by the contractor at subcontractor's or vendor's facilities). The specific quality cost data to be maintained and used will be determined by the contractor. These data shall, on request, be identified and made available for "on site" review by the Government Representative.

4. FACILITIES AND STANDARDS

4.1 Drawings, Documentation and Changes. A procedure shall be maintained that concerns itself with the adequacy, the completeness and the currentness of drawings and with the control of changes in design. With respect to the currentness of drawings and changes, the contractor shall assure that requirements for the effectivity point of changes are met and that obsolete drawings and change requirements are removed from all points of issue and use. Some means of recording the effective points shall be employed and be available to the Government.

With respect to design drawings and design specifications, a procedure shall be maintained that shall provide for the evalua-

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tion of their engineering adequacy and an evaluation of the adequacy of proposed changes. The evaluation shall encompass both the adequacy in relation to standard engineering and design practices and the adequacy with respect to the design and purpose of the product to which the drawing relates.

With respect to supplemental specifications, process instructions, production engineering instructions, industrial engineering instructions and work instructions relating to a particular design, the contractor shall be responsible for a review of their adequacy, currentness and completeness. The quality program must provide complete coverage of all information necessary to produce an article in complete conformity with requirements of the design.

The quality program shall assure that there is complete compliance with contract requirements for proposing, approving, and effecting of engineering changes. The quality program shall provide for monitoring effectively compliance with contractual engineering changes requiring approval by Government design authority. The quality program shall provide for monitoring effectively the drawing changes of lesser importance not requiring approval by Government design authorities.

Delivery of correct drawings and change information to the Government in connection with data acquisition shall be an integral part of the quality program. This includes full compliance with contract requirements concerning rights and data both proprietary and other. The quality program's responsibility for drawings and changes extend to the drawings and changes provided by the subcontractors and vendors for the contract.

4.2 Measuring and Testing Equipment. The contractor shall provide and maintain gages and other measuring and testing devices necessary to assure that supplies conform to technical requirements. These devices shall be calibrated against certified measurement standards which have known valid relationships to national standards at

established periods to assure continued accuracy. The objective is to assure that inspection and test equipment is adjusted, replaced or repaired before it becomes inaccurate. The calibration of measuring and testing equipment shall be in conformity with military specification MIL-C-15662. In addition, the contractor shall insure the use of only such subcontractor and vendor sources that depend upon calibration systems which effectively control the accuracy of measuring and testing equipment.

4.3 Production Tooling Used as Media of Inspection. When production jigs, fixtures, tooling masters, templates, patterns and such other devices are used as media of inspection, they shall be proved for accuracy prior to release for use. These devices shall be proved again for accuracy at intervals formally established in a manner to cause their timely adjustment, replacement or repair prior to becoming inaccurate.

4.4 Use of Contractor's Inspection Equipment. The contractor's gages, measuring and testing devices shall be made available for use by the Government when required to determine conformance with contract requirements. If conditions warrant, contractor's personnel shall be made available for operation of such devices and for verification of their accuracy and condition.

4.5 Advanced Metrology Requirements. The quality program shall include timely identification and report to the Contracting Officer of any precision measurement need exceeding the known state of the art.

5. CONTROL OF PURCHASES

5.1 Responsibility. The contractor is responsible for assuring that all supplies and services procured from his suppliers (subcontractors and vendors) conform to the contract requirements. The selection of sources and the nature and extent of control exercised by the contractor shall be dependent upon the type of supplies, his supplier's demonstrated capability to perform, and the quality evidence made available. To assure an adequate and economical control of such

material, the contractor shall utilize to the fullest extent objective evidence of quality furnished by his suppliers. When the Government elects to perform inspection at a supplier's plant, such inspection shall not be used by contractors as evidence of effective control of quality by such suppliers. The inclusion of a product on the Qualified Products List only signifies that at one time the manufacturer made a product which met specification requirements. It does not relieve the contractor of his responsibility for furnishing supplies that meet all specification requirements or for the performance of specified inspections and tests for such material. The effectiveness and integrity of the control of quality by his suppliers shall be assessed and reviewed by the contractor at intervals consistent with the complexity and quantity of product. Inspection of products upon delivery to the contractor shall be used for assessment and review to the extent necessary for adequate assurance of quality. Test reports, inspection records, certificates and other suitable evidence relating to the supplier's control of quality should be used in the contractor's assessment and review. The contractor's responsibility for the control of purchases includes the establishment of a procedure for (1) the selection of qualified suppliers, (2) the transmission of applicable design and quality requirements in the Government contracts and associated technical requirements, (3) the evaluation of the adequacy of procured items, and (4) effective provisions for early information feedback and correction of nonconformances.

5.2 Purchasing Data. The contractor's quality program shall not be acceptable to the Government unless the contractor requires of his subcontractors a quality effort achieving control of the quality of the services and supplies which they provide. The contractor shall assure that all applicable requirements are properly included or referenced in all purchase orders for products ultimately to apply on a Government contract. The purchase order shall contain a complete description of the supplies ordered including, by statement or reference, all

applicable requirements for manufacturing, inspecting, testing, packaging, and any requirements for Government or contractor inspections, qualification or approvals. Technical requirements of the following nature must be included by statement or reference as a part of the required clear description: all pertinent drawings, engineering change orders, specifications (including inspection system or quality program requirements), reliability, safety, weight, or other special requirements, unusual test or inspection procedures or equipment and any special revision or model identification. The description of products ordered shall include a requirement for contractor inspection at the subcontractor or vendor source when such action is necessary to assure that the contractor's quality program effectively implements the contractor's responsibility for complete assurance of product quality. Requirements shall be included for chemical and physical testing and recording in connection with the purchase of raw materials by his suppliers. The purchase orders must also contain a requirement for such suppliers to notify and obtain approval from the contractor of changes in design of the products. Necessary instructions should be provided when provision is made for direct shipment from the subcontractor to Government activities.

6. MANUFACTURING CONTROL

6.1 Materials and Materials Control. Supplier's materials and products shall be subjected to inspection upon receipt to the extent necessary to assure conformance to technical requirements. Receiving inspection may be adjusted upon the basis of the quality assurance program exercised by suppliers. Evidence of the suppliers' satisfactory control of quality may be used to adjust the amount and kind of receiving inspection.

The quality program shall assure that raw materials to be used in fabrication or processing of products conform to the applicable physical, chemical, and other technical requirements. Laboratory testing shall be employed as necessary. Suppliers shall be required by the contractor's quality program

to exercise equivalent control of the raw materials utilized in the production of the parts and items which they supply to the contractor. Raw material awaiting testing must be separately identified or segregated from already tested and approved material but can be released for initial production, providing that identification and control is maintained. Material tested and approved must be kept identified until such time as its identity is necessarily obliterated by processing. Controls will be established to prevent the inadvertent use of material failing to pass tests.

6.2 Production Processing and Fabrication. The contractor's quality program must assure that all machining, wiring, batching, shaping and all basic production operations of any type together with all processing and fabricating of any type is accomplished under controlled conditions. Controlled conditions include documented work instructions, adequate production equipment, and any special working environment. Documented work instructions are considered to be the criteria for much of the production, processing and fabrication work. These instructions are the criteria for acceptable or unacceptable "workmanship". The quality program will effectively monitor the issuance of and compliance with all of these work instructions.

Physical examination, measurement or tests of the material or products processed is necessary for each work operation and must also be conducted under controlled conditions. If physical inspection of processed material is impossible or disadvantageous, indirect control by monitoring processing methods, equipment and personnel shall be provided. Both physical inspection and process monitoring shall be provided when control is inadequate without both, or when contract or specification requires both.

Inspection and monitoring of processed material or products shall be accomplished in any suitable systematic manner selected by the contractor. Methods of inspection and monitoring shall be corrected any time their unsuitability with reasonable evidence is demonstrated. Adherence to selected methods

for inspection and monitoring shall be complete and continuous. Corrective measures shall be taken when noncompliance occurs.

Inspection by machine operators, automated inspection gages, moving line or lot sampling, setup or first piece approval, production line inspection station, inspection or test department, roving inspectors — any other type of inspection — shall be employed in any combination desired by the contractor which will adequately and efficiently protect product quality and the integrity of processing.

Criteria for approval and rejection shall be provided for all inspection of product and monitoring of methods, equipment, and personnel. Means for identifying approved and rejected product shall be provided.

Certain chemical, metallurgical, biological, sonic, electronic, and radiological processes are of so complex and specialized a nature that much more than the ordinary detailing of work documentation is required. In effect, such processing may require an entire work specification as contrasted with the normal work operation instructions established in normal plant-wide standard production control issuances such as job operation routing books and the like. For these special processes, the contractors' quality program shall assure that the process control procedures or specifications are adequate and that processing environments and the certifying, inspection, authorization and monitoring of such processes to the special degree necessary for these ultraprecise and super-complex work functions are provided.

6.3 Completed Item Inspection and Testing. The quality program shall assure that there is a system for final inspection and test of completed products. Such testing shall provide a measure of the overall quality of the completed product and shall be performed so that it simulates, to a sufficient degree, product end use and functioning. Such simulation frequently involves appropriate life and endurance tests and qualification testing. Final inspection and testing shall provide for reporting to designers any unusual difficulties, deficiencies or question-

able conditions. When modifications, repairs or replacements are required after final inspection or testing, there shall be reinspection and retesting of any characteristics affected.

6.4 Handling, Storage and Delivery. The quality program shall provide for adequate work and inspection instructions for handling, storage, preservation, packaging, and shipping to protect the quality of products and prevent damage, loss, deterioration, degradation, or substitution of products. With respect to handling, the quality program shall require and monitor the use of procedures to prevent handling damage to articles. Handling procedures of this type include the use of special crates, boxes, containers, transportation vehicles and any other facilities for materials handling. Means shall be provided for any necessary protection against deterioration or damage to products in storage. Periodic inspection for the prevention and results of such deterioration or damage shall be provided. Products subject to deterioration or corrosion during fabrication or interim storage shall be cleaned and preserved by methods which will protect against such deterioration or corrosion. When necessary, packaging designing and packaging shall include means for accommodating and maintaining critical environments within packages, e.g., moisture content levels, gas pressures. The quality program shall assure that when such packaging environments must be maintained, packages are labeled to indicate this condition. The quality program shall monitor shipping work to assure that products shipped are accompanied with required shipping and technical documents and that compliance with Interstate Commerce Commission rules and other applicable shipping regulations is effected to assure safe arrival and identification at destination. In compliance with contractual requirements, the quality program shall include monitoring provisions for protection of the quality of products during transit.

6.5 Nonconforming Material. The contractor shall establish and maintain an effective

and positive system for controlling nonconforming material, including procedures for its identification, segregation, and disposition. Repair or rework of nonconforming material shall be in accordance with documented procedures acceptable to the Government. The acceptance of nonconforming supplies is a prerogative of and shall be as prescribed by the Government and may involve a monetary adjustment. All nonconforming supplies shall be positively identified to prevent unauthorized use, shipment and intermingling with conforming supplies. Holding areas or procedures mutually agreeable to the contractor and the Government Representative shall be provided by the contractor. The contractor shall make known to the Government upon request the data associated with the costs and losses in connection with scrap and with rework necessary to reprocess nonconforming material to make it conform completely.

6.6 Statistical Quality Control and Analysis. In addition to statistical methods required by the contract, statistical planning, analysis, tests and quality control procedures may be utilized whenever such procedures are suitable to maintain the required control of quality. Sampling plans may be used when tests are destructive, or when the records, inherent characteristics of the product or the noncritical application of the product, indicate that a reduction in inspection or testing can be achieved without jeopardizing quality. The contractor may employ sampling inspection in accordance with applicable military standards and sampling plans (e.g., from MIL-STD-105, MIL-STD-414, or Handbooks H 106, 107 and 108). If the contractor uses other sampling plans, they shall be subject to review by the cognizant Government Representative. Any sampling plan used shall provide valid confidence and quality levels.

6.7 Indication of Inspection Status. The contractor shall maintain a positive system for identifying the inspection status of products. Identification may be accomplished by means of stamps, tags, routing cards, move tickets, tote box cards or other normal con-

trol devices. Such controls shall be of a design distinctly different from Government inspection identification.

7. COORDINATED GOVERNMENT/CONTRACTOR ACTIONS

7.1 Government Inspection at Subcontractor or Vendor Facilities. The Government reserves the right to inspect at source supplies or services not manufactured or performed with the contractor's facility. Government inspection shall not constitute acceptance; nor shall it in any way replace contractor inspection or otherwise relieve the contractor of his responsibility to furnish an acceptable end item. The purpose of this inspection is to assist the Government Representative at the contractor's facility to determine the conformance of supplies or services with contract requirements. Such inspection can only be requested by or under authorization of the Government Representative. When Government inspection is required, the contractor shall add to his purchasing document the following statement:

"Government inspection is required prior to shipment from your plant. Upon receipt of this order, promptly notify the Government Representative who normally services your plant so that appropriate planning for Government inspection can be accomplished."

When, under authorization of the Government Representative, copies of the purchasing document are to be furnished directly by the subcontractor or vendor to the Government Representative at his facility rather than through Government channels, the contractor shall add to his purchasing document a statement substantially as follows:

"On receipt of this order, promptly furnish a copy to the Government Representative who normally services your plant, or, if none, to the nearest Army, Navy, Air Force, or Defense Supply Agency inspection office. In the event the representative or office cannot be located, our purchasing agent should be notified immediately."

All documents and referenced data for purchases applying to a Government contract shall be available for review by the Government Representative to determine compliance with the requirements for the control of such purchases. Copies of purchasing documents required for Government purposes shall be furnished in accordance with the instructions of the Government Representative. The contractor shall make available to the Government Representative reports of any nonconformance found on Government source inspected supplies and shall (when requested) require the supplier to coordinate with his Government Representative on corrective action.

7.2 Government Property.

7.2.1 Government-furnished Material. When material is furnished by the Government, the contractor's procedures shall include at least the following:

- (a) Examination upon receipt, consistent with practicability to detect damage in transit;
- (b) Inspection for completeness and proper type;
- (c) Periodic inspection and precautions to assure adequate storage conditions and to guard against damage from handling and deterioration during storage;
- (d) Functional testing, either prior to or after installation, or both, as required by contract to determine satisfactory operation;
- (e) Identification and protection from improper use or disposition; and
- (f) Verification of quantity.

7.2.2 Damaged Government-furnished Material. The contractor shall report to the Government Representative any Government-furnished material found damaged, malfunctioning, or otherwise unsuitable for use. In the event of damage or malfunctioning during or after installation, the contractor shall determine and record probable cause and necessity for withholding material from use.

7.2.3 Bailed Property. The contractor shall, as required by the terms of the Bailment Agreement, establish procedures for the ade-

quate storage, maintenance and inspection of bailed Government property. Records of all inspections and maintenance performed on bailed property shall be maintained. These procedures and records shall be subject to review by the Government Representative.

8. NOTES

(The following information is provided solely for guidance in using this specification. It has no contractual significance.)

8.1 Intended Use. This specification will apply to complex supplies, components, equipments and systems for which the requirements of MIL-I-45208 are inadequate to provide needed quality assurance. In such cases, total conformance to contract requirements cannot be obtained effectively and economically solely by controlling inspection and testing. Therefore, it is essential to control work operations and manufacturing processes as

well as inspections and tests. The purpose of this control is not only to assure that particular units of hardware conform to contractual requirements, but also to assure interface compatibility among these units of hardware when they collectively comprise major equipments, sub-systems and systems.

8.2 Exemptions. This specification will not be applicable to types of supplies for which MIL-I-45208 applies. The following do not normally require the application of this specification:

- (a) Personal services, and
- (b) Research and development studies of a theoretical nature which do not require fabrication of articles.

8.3 Order Data. Procurement documents should specify the title, number and date of this specification.

Custodians:

Army—Munitions Command
Navy—Office of Naval Material
Air Force—Hq USAF
DSA—Hq DSA

Preparing Activity:

Air Force—Hq USAF

APPENDIX B

INTERVIEW GUIDE

Questions for Contractors and Government Managers

1. In the case of the _____ Program, describe any effects pertaining to organizational and staffing patterns, which resulted from the award fee feature in the contract.

a. How, for instance, did it affect the way you organized or staffed your program office?

b. How did it affect the nature of your relations with other parts of your company?

c. How did it affect the nature of your relations with the government program office?

d. ..with other government offices?

e. Are there any differences in the way your program office, or its components operate as a result of the award fee?

f. Will you develop any award fee-oriented management methods--e.g., "gaming" of award fee evaluations, bonus systems, "intelligence" gathering?

g. Do you expect to find award fee administration any more or less costly than other forms of contract?

2. What information was given to contractors about the government award fee plan?

a. What were the performance factors?

b. What is the evaluation process?

c. Who would be evaluating?

d. When would evaluations be held?

3. What input do contractors contribute to Award Fee evaluations?
4. What feedback is given to the Contractors on the Award Fee evaluations?
5. What are the Award Fee Objectives?
6. How does the Award Fee affect organizational processes? Will there be special effects on:
 - a. Communication processes, especially between you and government program offices and personnel?
 - b. Management attention--the things you notice, the people who notice them, and the setting of priorities for activities?
 - c. Decision making--how you made decisions, or who participated in them?
 - d. Financial planning at program and at corporate levels?
7. Overall, do you believe the award fee will help or harm the program?
8. Is the Award Fee method used in subcontracting?
9. As you view it, what are the general strengths and weaknesses of the Award Fee method of acquisition?
10. As you view it, what are the general strengths and weaknesses of the Award Fee method of acquisition to stimulate better quality?

- a. In regards to stimulating better quality, how would you compare the Award Fee method with other "incentive" contracting methods?
 - b. In regards to stimulating better quality, have you any particular views on when Award Fee should be used? should not be used?
11. In regards to your program, what quality criteria would you use to evaluate
- a. The product?
 - b. For quality of design?
 - c. For quality of conformance?
 - d. For management of quality?
 - e. Objectively? Subjectively?
12. Was the contractor aware of the Award Fee during the design of the product? How did this influence the design of the product?
13. What problems do you expect to encounter with the quality criteria used by the government? Do you expect redundancies?
14. What feedback do you receive from the Air Force
- a. On maintainability, availability, and reliability?
 - b. On a regular basis? On a crisis basis?

APPENDIX C

QUALITY EVALUATION CRITERIA

ACES II Evaluation Criteria

1. Procedures Evaluation.
2. Timeliness/Adequacy of Corrective Action.
3. Work Instructions.
4. Trend Analysis and Internal Cost of Quality.
5. Calibration System.
6. Schedule Completion (QA aspects).
7. Major Deficiencies.
8. Cost of Quality.
9. Supplier Rating and Selection.
10. Quality Planning.
11. Source Inspection.
12. Manufacturing/Tooling Inspection.

Wild Weasel PUP Evaluation Criteria

Quality/Producibility

1. Adherence to Management System Requirements.
 - a. Quality Program per MIL-Q-9858A.
 - b. Control of Suppliers per MIL-STD-1535A.
 - c. Corrective Action and Disposition of Non-conforming Material per MIL-STD-1520B.

2. Quality of Design evidenced by:
 - a. Identifying critical product characteristics to fitness of use, controls are established for production/inspection/test, and design tolerances are compatible with manufacturing process variability.
 - b. Number of ECPS required to correct design or producibility deficiencies or to accomodate inability to meet specific performance requirements.
 - c. Incidents requiring TCRO action for field inspection, modification, retrofit, or replacement.
 - d. Early and successful demonstration of interchangeability and replaceability.
3. Effectiveness of contractor's in-process preventive quality control activity as reflected in data:
 - a. In-process failures and removals of purchased parts and components.
 - b. Rejection and return-to-vendor trends at receiving inspection.
 - c. Parts control and parts screening for semiconductors and microcircuits.
 - d. Yield rates (percent of items which pass ATP on first try) at SRU and LRU levels.

- e. Rework hours as a percent of total assembly hours.
- 4. Delivered product quality as reflected by"
 - a. Completed item inspection and system test results.
 - b. Waivers, deviations, shortages, unaccomplished tasks, open/unresolved failures as documented in acceptance data packages and DD Form 250.
 - c. "Cannot duplicate" or "retest OK" rate on returned units.
- 5. Innovations to enhanced productivity as evidenced by:
 - a. Development/implementation of employee motivational programs.
 - b. Effective application of non-destructive evaluation techniques.
 - c. Application of current technologies in inspection and test.
 - d. Application of current technologies in manufacturing assembly and process control.

Product Assurance

- 1. Management commitment as evidenced by written policy, organizational recognition, investment of resources, and supportive management decisions.

2. Acceptance testing is done under conditions which stress the hardware sufficiently to weed out marginal performers. Such stress screening is done at the lowest practical levels.
3. Failures are investigated as to cause, including physics of failure analysis when appropriate, and results are promptly fed back into design, manufacturing, process control, inspection, or test.
4. Field performance exceeds predicted levels for reliability, growth, availability, and supportability.

Evaluation Areas Suggested by Contractors

Quality of Design

1. Participation in Design Review.
2. Continued Configuration Management.
3. Goodness of Design (performance oriented).

Quality of Conformance

1. Producibility/Reliability.
2. First Article.
3. Physical Configuration Audit and Functional Configuration Audit.

Quality of Management

1. Management of Vendors and Suppliers.
2. Involvement in Increased Productivity.
3. Independent Quality Assurance reporting to Executive Division.
4. Properly Manned Organizational Structure.
5. Quality of People (knowledge and experience).
6. Trend Analysis and Corrective Action.

Evaluation Areas Suggested by Government Managers

Quality of Design

1. Reliability and Maintainability Criteria.
 - a. Mean Time Between Failure.
 - b. Mean Time To Repair.
2. Functional, Performance, and Design Specification.
3. Manufacturing and Test Yields.
4. Engineering Changes Rate (number and type after a specified period).

Quality of Conformance

1. Periodic Teardown Inspections.
 - a. Physical Configuration Audit.
 - b. Functional Configuration Audit.
2. Drawings and Specifications requirements.

3. Material Review Board Activity.
4. Waivers, Deviations, and Service Reports.
5. Tests and Test Procedures.

Quality of Management

1. Status of the Chief of Quality and his ability to affect change.
2. Responsiveness to Field Problems and their resolution.
3. Management of Vendors and Suppliers.
4. Approval for Changes and Substitutes.
5. Internal Quality Discipline.
6. Cost of Quality (scrap, rework, repair).
7. Management Involvement.
8. Employee Motivation.
9. Corrective Action.

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